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TITLE: Method of fabricating semiconductor device and
method of processing
substrate

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INVENTOR-INFORMATION:

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US-CL-CURRENT: 438/795; 438/149

ABSTRACT:

Method of fabricating a semiconductor device. A glass substrate such as Corning 7059 is used as a substrate. A bottom film is formed. Then, the substrate is annealed above the strain point of the glass substrate. The substrate is then slowly cooled below the strain point. Thereafter, a silicon film is formed, and a TFT is formed. The aforementioned anneal and slow cooling reduce shrinkage of the substrate created in later thermal treatment steps. This makes it easy to perform mask alignments. Furthermore, defects due to misalignment of masks are reduced, and the production yield is enhanced. In another method, a glass substrate made of Corning 7059 is also used as a

substrate. The substrate is annealed above the strain point. Then, the substrate is rapidly cooled below the strain point. Thereafter, a bottom film is formed, and a TFT is fabricated. The aforementioned anneal and slow cooling reduce shrinkage of the substrate created in later thermal treatment steps. Thus, less cracks are created in the active layer of the TFT and in the bottom film. This improves the production yield. During heating of the substrate, it is held substantially horizontal to reduce warpage, distortions, and waviness of the substrate.

8 Claims, 67 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 15

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Detailed Description Text - DETX:

First, a substrate made of Corning 7059 glass was annealed at 600.degree.-660.degree. C., e.g., 640.degree. C., above the strain point of 593.degree. C. of the glass for 1 to 4 hours, e.g., 1 hour. Then, the laminate was slowly cooled at a rate of 0.1.degree. to 0.5.degree. C./min, e.g., 0.2.degree. C./min. When the temperature dropped to 450.degree.-590.degree. C., e.g., 550.degree. C., the substrate was withdrawn. This withdrawing temperature is preferably lower than the maximum temperature in later thermal processing steps. That is, in the present example, the annealing temperature for crystallization is the maximum temperature in the later steps. Therefore, if the annealing temperature for crystallization is 600.degree. C., then it is desired to

withdraw the
substrate at a temperature below 600.degree. C. The above
thermal annealing
process was carried out in-an oxygen flow. This thermal
annealing is
preferably carried out by holding the substrate within
.+- .300.degree. from
horizontal in order to prevent the substrate from warping.